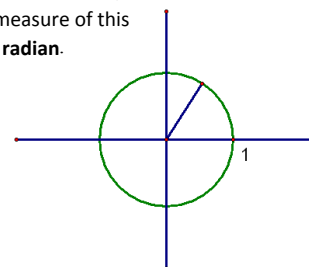


## Radians

A radian is defined using the unit circle, which is a circle with a radius of 1 unit centered at the origin. When a central angle intercepts an arc that has the same length as a radius of the circle, the measure of this angle is defined to be one **radian**.



The circumference of a circle is  $2\pi r$ , where  $r$  is the length of a radius. There are  $2\pi$  radians in one complete revolution about a point and one complete revolution equals  $360^\circ$ .

$$2\pi \text{ radians} = 360^\circ \quad \pi \text{ radians} = 180^\circ \quad 1 \text{ radian} \approx 57.3^\circ$$

Convert each degree measure to radian measure.

a.  $120^\circ$       b.  $-245^\circ$

$$120^\circ \cdot \frac{\pi}{180} = \frac{2\pi}{3}$$

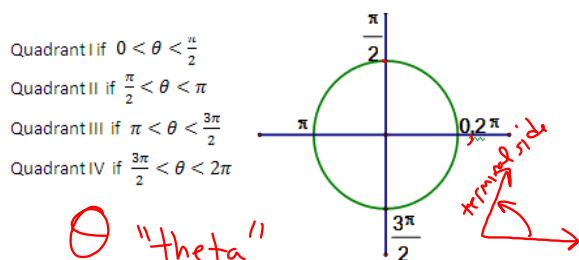
$$-245^\circ \cdot \frac{\pi}{180} = -\frac{49\pi}{36}$$

Convert each radian measure to degree measure.

a.  $\frac{\pi}{3}$  radians      b.  $-\frac{3\pi}{4}$  radians

$$\frac{\pi}{3} \cdot \frac{180}{\pi} = 60^\circ$$

$$-\frac{3\pi}{4} \cdot \frac{180}{\pi} = -135^\circ$$



In which quadrant or on which axis does the terminal side of the angle lie?

a.  $\frac{4\pi}{3}$

QIII

b.  $-\frac{5\pi}{4}$

go clockwise  
QII

c.  $\frac{9\pi}{2}$

on positive  
y-axis

1 minute ( $1'$ ) =  $(\frac{1}{60})^\circ$       1 second ( $1''$ ) =  $(\frac{1}{60})'$  or  $(\frac{1}{3600})^\circ$

Convert each angle measure as indicated.

a.  $12.464^\circ$  to degrees, minutes and seconds, to the nearest second.

$12^\circ$        $.464(60) = 27.84'$

$12^\circ 27' 50''$        $.84(60) = 50.4''$

b.  $23^\circ 42' 45''$  to decimal degrees, to the nearest tenth.

$23 + \frac{42}{60} + \frac{45}{3600} = 23.7^\circ$